THE CLAIMS

What is claimed is:

1. A golf ball comprising:

a core comprising a core layer comprising:

an elastomeric composition,

a reactive co-agent present by less than about 10 phr by weight of the elastomeric composition, and

a cross-linking agent;

a thin dense layer encasing the core, the thin dense layer being positioned at a radial distance outside a centroid radius of the golf ball, and having:

an inner diameter of at least about 38.4 mm,

a specific gravity of greater than about 1.2 g/cm^3, and

a thickness from about 0.025 mm to about 1.27 mm; and

a cover encasing the thin dense layer.

2. The golf ball of claim 1, wherein the elastomeric composition comprises a diene polymer.

3. The golf ball of claim 2, wherein the diene polymer is metallocene catalyzed.

4. The golf ball of claim 2, wherein the cross-linking agent is a peroxide.

5. The golf ball of claim 4, wherein the diene polymer is a polybutadiene.

6. The golf ball of claim 5, wherein the polybutadiene is metallocene catalyzed.

7. The golf ball of claim 2, wherein the cross-linking agent is sulfur.

8. The golf ball of claim 7, wherein the diene polymer is an ethylene-propylene-diene polymer.

9. The golf ball of claim 8, wherein the ethylene-propylene-diene polymer is metallocene catalyzed.

10. The golf ball of claim 8, wherein the ethylene-propylene-diene polymer comprises about 70% to about 90% ethylene.

11. The golf ball of claim 10, wherein the ethylene-propylene-diene polymer further comprises about 1% to about 5% ethylidene-2-norborene.

12. The golf ball of claim 1, wherein the elastomeric composition comprises a material selected from a group consisting of metallocene catalyzed polymers, poly(styrene-butadiene-styrene), SEBS, SEPS block polymers, styrene-ethylene block copolymers, and polar group grafted or copolymerized polymers.

13. The golf ball of claim 12, wherein the polar group grafted or copolymerized polymers comprise maleic anhydride or succinate modified metallocene catalyzed ethylene copolymers.

14. The golf ball of claim 1, wherein the reactive co-agent is present by less than about 5 phr.

15. The golf ball of claim 1, wherein the reactive co-agent is present by about 0 phr.

16. The golf ball of claim 1, wherein the reactive co-agent comprises a metal salt of diacrylate, dimethacrylate, or monomethacrylate, or a non-metallic oligomer.

17. The golf ball of claim 16, wherein the metal is selected from zinc, magnesium, calcium, barium, tin, aluminum, lithium, sodium, potassium, iron, zirconium, and bismuth.

18. The golf ball of claim 1, wherein the core layer has an Atti compression of about 0 to about 70.

19. The golf ball of claim 18, wherein the Atti compression of the core layer is about 10 to about 60.

20. The golf ball of claim 1, wherein the core layer has a specific gravity of less than about 1.05 g/cm^3.

21. The golf ball of claim 1, wherein the core layer has a diameter of about 41.15 mm or less.

22. The golf ball of claim 1, wherein the core further comprises an innermost core encased by the core layer.

23. The golf ball of claim 22, wherein the innermost core comprises a diene polymer and about 10 phr to about 50 phr of a reactive co-agent.

24. The golf ball of claim 22, wherein the innermost core comprises a diene polymer and at least about 50 phr of a reactive co-agent.

25. The golf ball of claim 1, wherein the specific gravity of the thin dense layer is greater than about 1.5 g/cm^3.

26. The golf ball of claim 1, wherein the specific gravity of the thin dense layer is greater than about 2.0 g/cm^3.

27. The golf ball of claim 1, wherein the thickness of the thin dense layer is about 0.127 mm to about 0.76 mm.

28. The golf ball of claim 1, wherein the thickness of the thin dense layer is about 0.25 mm to about 0.5 mm.

29. The golf ball of claim 1, wherein the thin dense layer is made from a densified loaded film.

30. The golf ball of claim 1, wherein the thin dense layer is made from a polymer loaded with a specific gravity increasing agent.

31. The golf ball of claim 1, wherein the thin dense layer is made from a diene polymer with tungsten powder.

32. The golf ball of claim 1, wherein the thin dense layer is applied to the core as a liquid solution.